# Description of Sleep Quality and Behaviors in Baccalaureate Nursing Students

Literature Review and Methods

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**Abstract**

Sleep is a critical part of maintaining overall health, regardless of a person's age, sex or ethnicity. It not only gives the body a chance to rest, but it also allows for the mind to build pathways necessary to learn and create memories. Neglecting to get the recommended amount of sleep per night has a negative impact on next day functioning, and also can be detrimental to long term health. Because of the correlation between sleep and memory formation and learning, sleep is of particular importance to college students. A specific subset of college students is baccalaureate nursing students. Nursing students have a rigorous course load, which necessitates adequate sleep. The purpose of the study is to describe sleep behavior and sleep quality in baccalaureate nursing students. This will be a single-group descriptive cross-sectional design. The study will use an investigator-designed electronic survey delivered through the Checkbox survey site. Checkbox was selected as the system provides the required data-protection mechanisms. The highly recognized and utilized Pittsburgh Sleep Quality Index (PSQI) will be used to collect the data. The PSQI evaluates sleep quality for the previous month. The data will be collected from the survey site and imported into SPSS 17.0. The data will be evaluated for completeness. Descriptive statistics will be generated for the data. Exploratory analysis will then be conducted to determine if differences exist between levels in reports of sleep quality and behaviors. Anticipated findings include reported insufficient amounts of sleep per night and a poor perception of quality of sleep, as described by nursing students. Nursing students are the future of nursing as a profession. Their health and well being will play a role in the quality of nursing years down the road. If the study demonstrates a problem related to sleep hygiene, further exploration of interventions will be recommended.

## Introduction

Sleep is a restorative, vital part of life. It is often under-valued and put off as just a time to turn off the mind. However, this is not the case. Sleep provides a time for the mind to build the pathways to learn and create memories (National Heart, Lung and Blood Institute (NHLBI), 2005). It is a time for the mind to reinforce the pathways so that they may run at top speed during waking hours (NHLBI, 2005). Sleep not only has a large impact on mental functioning, it also affects mood and overall health (NHLBI, 2005). Adolescents are predisposed to sleep problems. There are multiple reasons they have such problems, but behavioral habits seem to have a predominant impact (Mesquita & Reimão, 2007). The rigorous coursework for many college students often leads to a decreased amount of sleep (Kerman & Wheat, 2008). Nursing students, in particular, have intense academic demand. These extra demands often lead to students forgoing the needed amount of sleep in order to stay up to date on coursework (Clement et al., 2002). Additionally, nursing students need to take good care of themselves in order to effectively care for clients (Clement et al., 2002).

## Review of Literature

### *Sleep*

There are two types of sleep: rapid eye movement (REM) sleep and non-REM sleep. Non-REM sleep is comprised of four different stages. A typical sleep cycle beings in non-REM sleep, progresses through the four stages into REM sleep, then starts over again. Stage 1 of non-REM sleep is characterized by a light sleep, from which a person is easily awakened. Eye movements and muscle activity begin to slow down in this stage. Eye movements eventually stop, thus stage 2 non-REM sleep begins. Brain waves slow down, with intermittent periods of

rapid waves. Following stage 2, the body enters into 'deep sleep', also known as stages 3 and 4 non-REM sleep. This is the time when it is most difficult to awake a person and considered the healing portion of sleep. Without deep sleep, a person will fail to feel rested and energetic during the day. In stage 3 brain waves are even slower; however there are still occasional periods of rapid waves. In stage 4 brain waves reach their slowest speed. After the non-REM stages, the brain will progress into REM sleep. Eye movement increases as do respirations, heart rate, and blood pressure. Breathing also becomes irregular and shallow. In REM sleep the muscles of the extremities are paralyzed. This is the stage in which dreaming occurs. A person will progress through this cycle numerous times in one night (NHLBI, 2005). Approximately half of sleep is spent in stages 1 and 2 of non-REM sleep. REM sleep is extremely important, although the exact reason why it is so important is not currently understood (NHLBI, 2005). However, it is known that the regions for learning and forming memories are stimulated during REM (NHLBI, 2005).

Sleep is not just a phenomenon of human society; it is biologically ingrained in every person. Sleep is regulated by something called a biological clock. It is a bundle of cells in the brain that reacts to the light signals received through the eyes. As darkness begins, the biological clock triggers the production of the hormone melatonin (NHLBI, 2005). Melatonin is a hormone that will increase drowsiness and sleepiness. The amount of melatonin in the body increases as the night progresses, which is why people are most sleepy between 12 and 7AM.

*Sleep disturbances*

The National Institutes of health states that most adults need between 7 and 8 hours of sleep a night. This amount can vary from individual to individual. However, only 28% of

Americans report getting 8 hours or more of sleep per night (National Sleep Foundation, 2009). If a person reduces the amount of sleep by only one hour in a night, it still has a significant impact on next day functioning (NHLBI, 2005). Response time, ability to focus, and performance at a job or school can all be adversely affected (NHLBI, 2005). This decreased amount of sleep negatively impacts health. People who do not get enough sleep are significantly more likely to be unable to: work well and efficiently, exercise, eat healthy, have sex, or engage in leisure activities. The inability to perform these tasks can have a large negative impact on a person's overall health. (National Sleep Foundation, 2009). For example, sleep provides a period of rest for the vascular system, including the heart. During sleep, heart rate and blood pressure decrease by about 10%. This occurrence is very important for overall cardiovascular health. Without the dip, a person is more likely to develop problems associated with the cardiovascular system (NHLBI, 2005). Additionally, without adequate periods of deep sleep the body does release additional growth hormone. Growth hormone drives growth in kids, increases muscle mass, and enables the repair of cells and tissues. Other hormones that sleep triggers the release of are sex hormones. Therefore, people who do not get enough sleep have an increased risk of infertility. Reduced amounts of sleep increase susceptibility to infections. During sleep the body creates more cytokines and without sleep there is no opportunity for this process (NHLBI, 2005).

*Sleep disturbances in shift workers and nurses*

There is an increasing demand for nursing care; with demand far outstripping supply of nurses. In order to meet the need, many nurses find themselves working extended shift or additional shifts per week (Surani & Murphy, 2007). Excessive time spent working, limits time

available to dedicate to sleep. Thus resulting in many nurses working while suffering from sleep deprivation. Not only do nurses seem to have a high prevalence of sleep disturbances related to long hours, but they also experience problems related to shift work. Shift work is when a person must be awake and working during a time period that the body is naturally programed to sleep (Chung, Wolf, & Shapiro, 2009). The irregular sleeping hours caused by shift work have been shown to cause health problems (Chung, Wolf & Shapiro, 2009). Not only can shift work be detrimental to physical and mental health, it can also cause problems in social interactions. This is of particular importance to nursing, because a majority of female shift workers are nurses (Chung, Wolf, & Shapiro, 2009). Additionally, there is an obvious impairment in performance due to sleep deprivation. This can result in accidents, medication errors, and issues with safety (Kunert, King, & Kolkhorst, 2007). A nurse's ability to perform his/her job safely and effectively is related to his/her level of fatigue. Fatigue is generated by a lack of sleep, a common problem for many nurses (Kunert, King, & Kolkhorst, 2007). Fatigue impacts all types of nurses, both night and day shift (Kunert, King, & Kolkhorst, 2007). Although nurses, regardless of shift, experience fatigue, night shift nurses are affected at a much higher level (Kunert, King, & Kolkhorst, 2007). Amount of time spent on duty is only one of the factors that contribute to fatigue in nurses. Time off in between shifts, intershift recovery, also plays a role in fatigue level. When nurses work rotating shifts, the intershift recovery period is greatly diminished (Fang et al., 2008). This intershift recovery period should provide adequate time for the nurse to sleep. Fang et al. (2008) suggests that when scheduling nurses, this intershift recovery period be taken into account to improve fatigue levels. Kunert et al. (2007) suggests that interventions focused on decreasing fatigue by improving sleep quality may benefit nurses

quality of life and improve job performance. Patient outcomes my be adversely affected by fatigue in nurses. Many nurses report needing medications to aid in sleep (Kunert, King, & Kolkhorst, 2007). If nurses cannot take proper care of themselves, which includes getting enough sleep to prevent fatigue, it greatly impacts patient care. It is impossible for nurses to be expected to function at top physical and mental levels when they are acutely and/or chronically fatigued.

*Sleep disturbances in adolescents and college-aged students*

Sleep is important to everyone regardless of age, sex, or ethnicity. Insufficient sleep has been shown to be highly correlated with fatigue in students (Lee, Y.; Chien, K.; and Chen, H., 2007). However, because of the high correlation between sleep and memory, learning, and focus it is especially important for students. College students have rigorous courses requiring a high intellect level and focus, which increases the need and importance of sleep. Students are notorious for not getting enough sleep (Teens and Sleep, NSF). Approximately 59% of college students reported some time of sleep difficulties (Kerman, W.D., & Wheat, M.E., 2008). This lack of sleep can manifest in all of the previously mentioned adverse health problems.

The limited research done to study the sleep patterns of college students has revealed several tendencies. In a study done by Tsai and Li (2003) sleep quality was positively related to time asleep and sleep efficiency. However, it was negatively associated with sleep latency and number of awakenings. In general, rise time was significantly earlier during the week than on the weekends. Also, many indicators of quality of sleep were lower during the week. For example, students had less time in bed, less time asleep, and lower sleep efficiency (Tsai, L-L., & Li, S-P., 2003). In general, women seem to have poorer quality and quantity of sleep (Forquer,

L.M., et al., 2008; Kerman, W.D., & Wheat, M.E., 2008; Tsai, L-L., & Li, S-P., 2003 ). Women tended to report more sleep disturbances than men; including, more awakenings during the night (Kerman, W.D., & Wheat, M.E., 2008). Women also reported longer nap times than men. Sleep latency, defined by Tsi and Li (2003) as longer than 30 minutes. And using this definition, women have a significantly higher percentage of sleep latency difficulties. The weekend seemed to alleviate some of the sleep difficulties reported by men, but not for the women. An additional benefit from the weekend is a greater amount of sleep (Forquer, L.M., et al., 2008). However, this increased time spent asleep, did not seem to have a significant impact on overall ratings of quality and quantity of sleep.

Not only were gender differences common findings, but also differences between grades. Freshman, due to an earlier rise time, had a shorter sleep time during the night (Tsai, L-L., & Li, S-P., 2003). Seniors were found to have the longest sleep latency and naptimes. Also, the students with the long naptimes had more awakenings at night (Tsai, L-L., & Li, S-P., 2003). In general, the students reported a later rise time, longer time spent in bed and asleep and better quality on the weekends.

In a study done by Pilcher and Walters (1997) participants were deprived of sleep for 24 hours and asked to complete a cognitive task and two questionnaires. The study found that the sleep deprived participants performed significantly worse on the cognitive task. However, the sleep deprived participants reported higher levels of concentration, effort and overall performance (Pilcher and Walters, 1997). The findings of the study indicate that college students are unaware of the effects of sleep deprivation on their ability to complete cognitive tasks. In a study by Engle-Friedman et al. (2003) participants who were sleep deprived were shown to

select less demanding tasks than non-sleep deprived participants. This may seem an insignificant finding; however, when it is looked at in a broader context the gravity of the choice is revealed. When students do not get enough sleep, they are reducing their efforts. This reduction can result in reduced educational goals inside the classroom and in the real world (Engle-Friedman et al., 2003). This finding is very disturbing. Students do not realize they are causing harm to their academic performance and lowering their goals or standards (Engle-Friedman et al., 2003).

One study actually took an interventional approach to determine the effects of sleep. Kamdar, B.B. et al (2004) measured the effects of prolonged sleep extension as opposed to the effects of sleep deprivation. The study's findings substantiated the previous research. In the study, sleep totals during the extension periods increased significantly. The sleep totals were measured both objectively (actigraphy) and subjectively (journals). Overall performance significantly increased, with it being statistically significant. Kamdar, B.B. et al. (2004) used a Multiple Sleep Latency Test, reaction time and mood ratings as measurements for improvements. With sleep extension, all of the measurements showed consistent improvement. Additionally, Profiles of Mood States (mood ratings) and fatigue scores improved with sleep extension. When participants rated themselves as being satiated by their sleep, there was a net change in the positive for vigor and a decrease of fatigue ratings. Overall, there were "very clear improvements in the satiated group" (Kamdar, B.B. et al., 2004). Sleep debt occurs when an individual habitually gets less than adequate amounts of sleep. However, Kamdar, B.B. et al. (2004) was able to show that with sleep extension replacing the sleep debt, improvements in waking function are possible.

Several studies have reported an adverse affect on academic performance when students experience difficulties is some aspect of sleep. Total sleep time, erratic sleep/wake schedules, late bed and rise times, and poor sleep quality are negatively associated with academic performance for students in all levels of education (Wolfson, & Carskadon, 2003). These findings were consistent with a study done by Pagel, Forister and Kwiatkowki (2007). The students filled out a questionnaire about their sleep patterns and GPA. The evidence showed a high frequency of sleep disturbances in the adolescents (Pagel, Forister, & Kwiatkowki, 2007). These sleep disturbances adversely affect daytime performance, using GPA as a measurement. The study not only reports the significant impact of sleep on GPA, but it also controls for age and household income. The number and type of sleep variables that were able to impact GPA changed after controlling for the socioeconomic variables. However, adverse significant effects on school performance were still evident (Pagel, Forister, & Kwiatkowki, 2007). The variables significantly related to GPA included restless/aching legs, difficulty concentrating during the day, and sleepiness during the day. Students who did not find it hard to wake up in the morning and did not snore every night reported higher GPAs. This study not only pointed out the immense impact poor sleep can have on academics, but also that socioeconomic factors do indeed play a role in GPA. Kelly, W.E., Kelly, K.E., & Clanton, R.C. (2001) completed a study that had similar findings. Shorter sleepers reported a mean GPA of 2.74 while long sleepers reported a mean GPA of 3.24. The difference between GPAs of long sleepers and short sleepers was determined to be significant (Kelly, W.E., Kelly, K.E., & Clanton, R.C., 2001).

Further research has revealed that sleep problems may lead to depression (Moo-Estrella, J., et al., 2004). In the study approximately one-third of the students were found to have

excessive sleepiness. A staggering 80% of the total sample reported somnolence during class. And of this group, 66% considered that sleepiness affected their performance in school. Students, with and without depressive symptoms, reported somnolence during class. A higher percentage was noted in students with depressive symptoms (Moo-Estrella, J., et al., 2004). These students also perceived their depressive symptoms to have a more significant affect on their academics. The study also revealed the students with depressive symptoms had a poorer quality of sleep, greater sleep latency, and greater number of awakenings (Moo-Estrella, J., et al., 2004). Overall, levels of sleepiness were significantly higher in students with depressive symptoms. The findings of this study indicated excessive somnolence is the dominant symptom of sleep alterations. And, this manifestation of lack of sleep results in serious consequences. Some consequences include diminished cognitive performance or auto accidents (Moo-Estrella, J., et al., 2004).

A study done by Carney et al. (2007) examined the relationship between daily activities and sleep in college students. The study showed that good sleepers tended to have earlier rise times than the poor sleepers. Also, there was a lower frequency and less regularity of social rhythms in poor sleepers (Carney et al., 2007). College students who were poor sleepers had a greater schedule variability than did the self-reported good sleepers. Carney et al. (2007) suggests educating college students about standardizing their rise times in order to increase the percentage of good sleepers. This study demonstrates that a delayed sleep-wake cycle is associated with poor sleep quality. Because college students have been shown to prefer a delayed sleep-wake cycle, they are at greater risk for poor sleep and the consequences associated (Carney et al., 2007). Mesquita & Reimão (2007) conducted a study to further examine sleep

quality in adolescents. The study examined night time use of the computer. There was a very high percentage, 65%, of participants who used the computer at night (Mesquita & Reimão, 2007). Night time computer use is associated with irregular patterns in behavior, resulting in poor sleep quality (Mesquita & Reimão, 2007). The results in the study were determined to be statistically significant, with a p value of 0.0062. The results of this study indicate that nocturnal use of the computer is associated with poor sleep quality. Poor sleep quality thus in turn impacts daytime functioning. With poor sleep, there are high indexes of daytime sleepiness and sleep disorders (Mesquita & Reimão, 2007).

Sleep is such an important part of life which people seem to neglect. College students appear to have a disproportional amount of alterations in sleep. Although sleep is essential to survival and there is a high prevalence of sleep disturbances, there is little research done with the college population. Nursing students, have a unique undergraduate curriculum, thus unique sleep needs and habits. Hence, this study aims to describe and compare the sleep patterns in college nursing students.

*Sleep disturbances in nursing students.*

Nursing students are a unique population. They have vigorous coursework and intense academic demands (Clement et al., 2002). These requirements are often thought to contribute to poor health habits in nursing students. The curriculum of nursing students is heavily weighted with health related courses (Clement et al., 2002). Although these courses have been shown to be correlated with an increase in personal health behaviors, the increase does not apply to all behaviors (Clement et al., 2002). In a longitudinal study conducted by Clement et al. (2002) nursing students exhibited improved health behaviors in areas such as alcohol use, tobacco use,

and breast self-examinations. Additionally, the percentages of nursing students who practiced poor health behaviors such as alcohol and tobacco use were significantly lower than that of the general population (Clement et al., 2002). However, the percent of students getting the recommended amount of sleep per night decreased over the study. Nursing students demonstrated a lower percentage of people getting adequate sleep. The difference between the percents of nursing students and the general population regarding amount of sleep was statistically significant (Clement et al., 2002). Approximately 60% of nursing students in a study done by Kernan & Wheat (2008) perceived sleep difficulties as an academic threat and health concern. This lack of sleep reported in the aforementioned studies can be associated with an interference in cognitive and motor functioning. The findings by Kernan & Wheat (2008) and Clement et al. (2002) demonstrate the need for further research into the health behaviors of nursing students. Also, the importance of providing information and education on proper sleep hygiene is shown through the studies. The academic community should support students and emphasize the importance of taking care of themselves in order to effectively help clients with health related problems (Clement et al., 2002).

## Methods

### *Purpose*

The purpose of the study is to describe sleep behavior and sleep quality in baccalaureate nursing students.

### *Design*

This is be a single-group descriptive cross-sectional design.

*Sample*

The sample will be nursing students enrolled in the Ohio State University College of Nursing undergraduate program. A total at least 90 students will be enrolled, 30 from each level of the nursing major (sophomore, junior, senior).

*Instrumentation*

This study will use an investigator-designed electronic survey delivered through the Checkbox survey site. This service was selected as the system provides the required data-protection mechanisms.

The survey will consist of demographic information (program level, gender, age, marital status) and the Pittsburgh Sleep Quality Index (PSQI). The PSQI is a widely recognized and utilized instrument that evaluates sleep quality for the previous month (Buyssee et al. 1989). The PQSI is a self-rated questionnaire consisting of 19 items. The questionnaire generates seven component scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction. The first four questions ask individual information. The remaining items score range is 0 to 3, with 0 indicating “better” and 3 indicating “worse”. The instrument has been found to have strong reliability and validity (Carpenter & Andrykowski, 1998; Buysse et al., 1989).

*Procedures*

Students will be invited via email to participate in the study. Once the sample at each level is reached, enrollment will be closed. At the completion of the survey, all participants will be invited via a separate link to register for a $5.00 payment for study participation.

*Statistical analysis plan*

The data will be collected from the survey site and imported into SPSS 17.0 (SPSS, Chicago, IL). The data will be evaluated for completeness. Descriptive statistics will be generated for the data. Exploratory analysis will be conducted to determine if there are differences between levels in reports of sleep quality and behaviors.

**Results**

Data was collected using the Checkbox 4.6 survey service. After completion of the survey, the data was imported into SPSS 17.0 (SPSS, Chicago, IL). The sample was composed of 12.9% male and 87.1% female. The age range of 17-23 made up of 93% of the sample. The remaining 7% of the sample was older than 23. The results revealed that on average, nursing students in all three years reported a problem getting to sleep within thirty minutes around once a week. Students in all three years also reported waking up in the middle of the night or early morning around one to twice a week. The first nursing students reported having to get up to use the bathroom during the night less than the second and third year students. First year nursing students reported feeling cold, less than both the second and third year nursing students. All three grade levels reported that it has been a slight-somewhat of a problem to keep up enough enthusiasm to get things done.

The data were analyzed using ANOVA. Three questions were found to be statistically significant. A p-value of 0.028 was found for the question rating how often the students wake up in the middle of the night and/or early morning. Students rated this as occurring between once and twice a week. The question regarding having to get up to use the bathroom in the middle of

the night was found to have a p-value of 0.009. The final question found to be statistically significant was regarding the frequency of feeling too cold, with a p-value of 0.006.

**Discussion**

After reviewing the data and evaluating for completeness and significance, the results were reviewed to draw conclusions. While not all questions were found to be statistically significant, problems with sleep were reported at least occasionally. The reported problem of waking up early or in the middle of the night could be due to the stress and anxiety associated with clinical rotations. Additionally, hospital shifts are scheduled around the clock and often begin early in the morning. As a student progresses through the nursing program s/he often has to juggle a varying class, work and clinical schedule. The variety of start times and stress associated with all three activities could be a contributing factor to the interrupted sleep and waking up early.

The question regarding waking up to use the bathroom could be influenced by consumption of fluids close to bed time. If the students consume caffeinated drinks, the frequency of urination will also increase. Caffeine is often used as a study aide and to assist students in staying awake. Using caffeine for these purposes will also contribute to more frequent trips to the bathroom.

The differences in reported frequency of feeling too cold has several possible explanations. For example, first year nursing students are more frequently residents in the student residence halls on campus. These residence halls are heated by the university and kept at a constant temperature. This may explain why a fewer number of first year nursing students reported feeling too cold. Second and third year nursing students often live off campus in

apartments and houses. Therefore, they must pay for their own gas bill. College students will likely be concerned about saving money. One way to do so is to keep the temperature set low in a house. Thus resulting in a lower gas bill. Although the bill will be lower, the students may feel cold more frequently.

The results of this study are descriptive and are evidence for further research. It is recommended that more studies are conducted to analyze the sleep patterns and disturbances in nursing students to determine the causes. Knowing the causes of reported issues will allow for appropriate education and interventions to be implemented into nursing curriculum.

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